Ash Creek Associates
Environmental and Geotechnical Consultants

October 17, 2012

Mr. Dwight Leisle
Port of Portland
7200 NE Airport Way
Portland, Oregon 97218

Re: Surface Soil Sampling Results — Former Wharf Road Area
Willamette Cove Upland Facility
Portland, Oregon
ECSI No. 271
1056-03

Dear Mr. Leisle:

This letter presents the results of the incremental unit surface soil sampling activities in the former Wharf Road Area completed in accordance with the Oregon Department of Environmental Quality (DEQ)-approved work plan, *Revision to Proposed Surface Soil Sampling — Former Wharf Road Area* (dated June 25, 2012). The sampling activities were conducted to support the preparation of the Source Control Evaluation (SCE) for the Willamette Cove Upland Facility (the Facility; Figures 1 and 2) in the St. Johns area of Portland, Oregon. Work at the Facility is being conducted under Voluntary Agreement EC-NWR-00-26 between the Port of Portland (Port), Metro, and the DEQ.

BACKGROUND

Sampling of erodible soil in the former Wharf Road area was initially requested in response to the DEQ's concerns that the riverbank armoring was incomplete. Following field observations for exposed soil, the DEQ indicated that erodible soils were not easily accessible due to thick and continuous armor cover. As an alternative, the DEQ requested that surface soil from the heavily vegetated bench area above the ordinary line of high water (OLHW) be sampled in the footprint of the historical Wharf Road. Shallow surface samples (WC-1 through WC-3; Figure 3) were collected following removal of the vegetated cover. A three-point composite surface soil sample (WC-1/2/3) was collected and discrete samples from each sub-sample location were collected and retained.

The chemical analyses included total petroleum hydrocarbon (TPH) hydrocarbon identification (HCID) by Northwest Method NWTPH-HCID, Priority Pollutant 13 Metals, polycyclic aromatic hydrocarbons (PAHs) by EPA Method 8270-SIM, polychlorinated biphenyls (PCBs) by EPA Method 8082, dioxins/furans by EPA Method 8290, and butyl tins (Krones Method). A follow-up analysis for diesel- and oil-range TPH by Northwest Method NWTPH-Dx (with silica gel cleanup) was completed on the composite sample. Additional follow-up analyses for metals and dioxins/furans were completed on the discrete samples due to exceedances of screening level values (SLVs) from the Joint Source Control Strategy (JSCS) guidance document (DEQ/EPA 2005; screening criteria revised July 16, 2007). PCBs, PAHs, and butyl tin concentrations in the composite sample were below the method reporting limits (MRLs) and/or below the applicable screening values. Based on these results, DEQ requested additional sampling.

SAMPLING ACTIVITIES

Preparatory Activities

The following activities and schedule coordination were completed in preparation for the field work.

- Health and Safety Plan (HASP). Ash Creek Associates, a Division of Apex Companies, LLC (Ash Creek) prepared a HASP for its personnel involved with the project.
- Coordination of Facility Access. The work activities were conducted in coordination with Metro.

Surface Soil Sampling

The following protocol was prepared based on the *ITRC Technical and Regulatory Guidance Incremental Sampling Methodology* (dated February 2012).

Surface soil samples were collected from three decision unit areas (DU-1 through DU-3) using an incremental sampling technique to assess the extent of dioxin/furans (Figure 3). Two of the decision unit samples, DU-2 and DU-3 were collected laterally and DU-1 was collected toward the top of the riverbank slope. The lower margin of the decision units was located at the approximate Mean High Water Line (MHWL). The MHWL was surveyed by Statewide Surveying (under subcontract to Ash Creek) on August 2, 2012 (Photograph 1; Attachment A). Each decision unit was comprised of an area of 50 feet by 100 feet.

Each decision unit sample consisted of thirty soil increments collected each 10- by 17-foot rectangular grid area within the decision unit (Figure 3; Photograph 2). The increment sample locations were established using a high-accuracy, handheld global positioning system (GPS) device (Trimble© GeoXH™). Where tree cover reduced satellite coverage and limited the accuracy of the GPS device, the grid centers were hand measured using a surveying stadia rod. The lower portions of the lateral decision units overlapped the armoring present on the riverbank. In cases where the grid was not sampleable (e.g., due to the presence of armor rock, presence of a concrete pad, or very thick poison oak coverage; Photographs 3 and 4) the sample location was moved to the nearest upslope grid that was sampleable. The sampleable increments collected in the lower row were typically only minor patches of materials within the armor rock (Photograph 2). The only exceptions were grids DU-2-4 and DU-2-5 which were relocated to the west of DU-2-1. The sample locations are presented on Figure 3.

The soil increments were collected from the top 6 inches of surface soil after removing vegetation (Photograph 5). The target mass of each increment was approximately 50 grams in order to achieve the overall target sample mass of 1.5 kilograms for each decision unit. A six-inch hole was initially excavated with hand tools (e.g., shovel, rock bar, etc; Photograph 6). A 50-gram increment sample was then collected from the sidewall of the hole using a sampling spoon and added to the sampling container for the decision unit. A No. 8 sieve (2.4 millimeter slot size) was used in the field to aid in the removal of gravels and organic debris. The increments were weighed in the field using a digital scale. Traditional duplicate samples were not collected, but a field replicate sample, DU-1R, was collected from DU-1. Each increment for the replicate sample was collected approximately 4 feet west of the primary increment locations.

CHEMICAL ANALYSES

The samples were submitted to Vista Analytical in El Dorado Hills, California for sample processing and analysis on a 15-business-day turnaround time (TAT)

The results of the laboratory analyses are presented in Table 1. The laboratory analytical report is included as Attachment B.

DATA QUALITY REVIEW

This section documents the results of a quality assurance/quality control (QA/QC) review of the analytical data for the incremental unit samples collected from the Former Wharf Road sampling. The incremental unit samples were analyzed within hold times. Laboratory QA/QC included a method blank and an Ongoing Precision and Recovery (OPR) sample. None of the compounds were reported above the MRL in the method blank. The OPR results were within the range of acceptable concentrations. A number of individual analytes in each sample were assigned with an "E" qualifier, indicating that the analyte was detected at a concentration that exceeded the calibration limit. Consequently, the reported concentration is an estimate and represents a value that may be biased high. Also, at least one dioxin group in each sample was reported as the maximum possible concentration due to possible chlorinated diphenylether interference during analysis that could interfere with the analysis of furans. The reported value for the analyte or analyte group is an estimate that is biased high.

If you have any questions regarding these activities, please contact the undersigned at (503) 924-4704.

Sincerely,

REGISTERED OREGON MICHAEL J. PICKERING No. G1942 GEOLOGIST

EXPIRES 12/31/12

Ian Maguire
Staff, Engineering Group

Michael J. Pickering, R.G.
Senior Associate Hydrogeologist

ATTACHMENTS

Table 1 – Former Wharf Road Area Surface Soil

Figure 1 – Facility Location Map
Figure 2 – Upland Facility Map
Figure 3 – Former Wharf Road Area Explorations

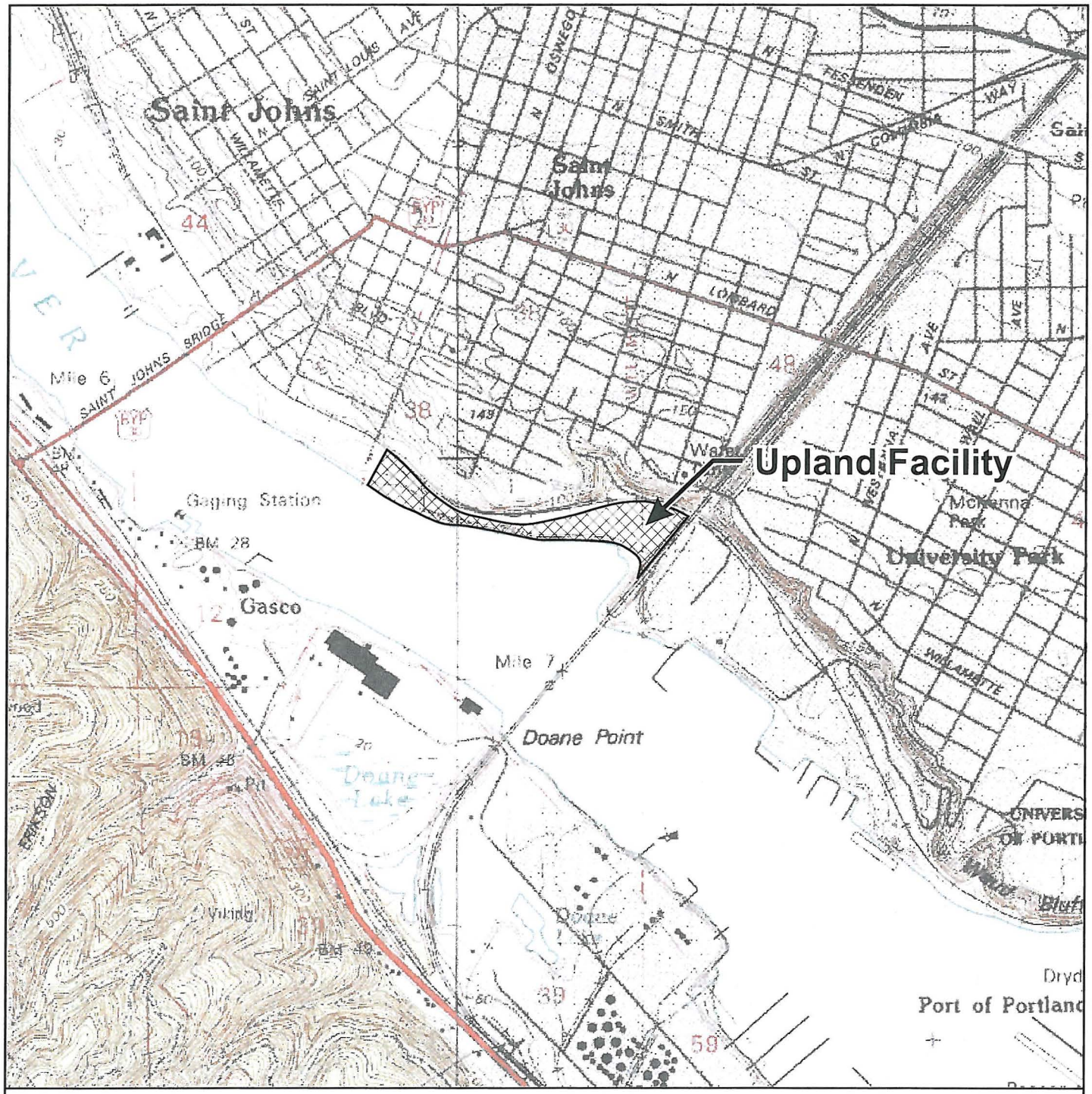
Attachment A – Photograph Log
Attachment B – Laboratory Analytical Report (CD-Rom)

Table 1 - Former Wharf Road Area Surface Soil
Willamette Cove Upland Facility
Portland, Oregon

		Beach	Surface Soil - Handheld Probe Locations on Riverbank				Incremental Samples			
PRIMARY SAMPLE	JSCS SLV	Wharf Beach -1	WC-1/2/3				DU-1	DU-1R	DU-2	DU-3
DISCRETE SAMPLES				WC-1 Surface	WC-2 Surface	WC-3 Surface				
Date Sampled		9/27/2010	10/1/2010	10/1/2010	10/1/2010	10/1/2010	8/9/2012	8/9/2012	8/8/2012	8/13/2012
Sample Interval (inches)		12-18	3-10	4-10	3-9	3-9	0-6	0-6	0-6	0-6
TPH-HCID (mg/kg)										
Diesel Range	--	DET	72.1	--	--	--	--	--	--	--
Gasoline Range	--	ND	<20.5	--	--	--	--	--	--	--
Motor Oil Range	--	DET	738	--	--	--	--	--	--	--
NWTPH-Gx (mg/kg)										
Gasoline Range Organics	--	1.4 J	--	--	--	--	--	--	--	--
NWTPH-Dx Silica Gel Cleanup (mg/kg)										
Diesel Range	--	397	72.3	--	--	--	--	--	--	--
Motor Oil Range	--	199	388	--	--	--	--	--	--	--
Metals (EPA 6000/7000 Series Methods; mg/kg)										
Antimony	64	0.57 J	4.9	6.9	7.2	2.5	--	--	--	--
Arsenic	7	39	8.6	24.8	11.9	7.3	--	--	--	--
Beryllium	--	0.45	0.19	0.31	0.38	0.28	--	--	--	--
Cadmium	1	1	1.7	0.37	0.49	0.88	--	--	--	--
Chromium	111	33.4	42.3	62.1	48.8	31.7	--	--	--	--
Copper	149	1,400	251	262	188	195	--	--	--	--
Lead	17	8,660	693	889	770	727	--	--	--	--
Nickel	49	25	28.4	54.5	43.1	49.1	--	--	--	--
Selenium	2	1	0.75	0.20 J,BU	0.21 J,BU	0.13 J,BU	--	--	--	--
Silver	5	0.18 J,BU	0.44 J,BU	0.6 BU	0.40 J,BU	0.35 J,BU	--	--	--	--
Thallium	--	0.080 J	0.24	0.070 J	0.077 J	0.056 J	--	--	--	--
Zinc	459	684	548	451	383	410	--	--	--	--
Mercury	0.07	113	5.5	8.1	1.7	1.4 H1	--	--	--	--
PAHs (EPA 8270 SIM; ug/kg)										
1-Methylnaphthalene	--	40	15.3	--	--	--	--	--	--	--
2-Methylnaphthalene	200	79	35	--	--	--	--	--	--	--
Acenaphthene	300	13	7.5	--	--	--	--	--	--	--
Acenaphthylene	200	51	19.4	--	--	--	--	--	--	--
Anthracene	845	34	27.3	--	--	--	--	--	--	--
Benzo(a)anthracene	1,050	103	82.1	--	--	--	--	--	--	--
Benzo(a)pyrene	1,450	78	121	--	--	--	--	--	--	--
Benzo(b)fluoranthene	--	123 1n(a)	155	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	300	30	90.8	--	--	--	--	--	--	--
Benzo(k)fluoranthene	13,000	110 1n(a)	94.6	--	--	--	--	--	--	--
Chrysene	1,290	146	116	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	1,300	13	34.6	--	--	--	--	--	--	--
Fluoranthene	2,230	315	152	--	--	--	--	--	--	--
Fluorene	536	30	9.5	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	100	30	78.6	--	--	--	--	--	--	--
Naphthalene	561	203	75.2	--	--	--	--	--	--	--
Phenanthrene	1,170	187	104	--	--	--	--	--	--	--
Pyrene	1,520	256	139	--	--	--	--	--	--	--
PCBs (EPA Method 8082; ug/kg)										
PCB-1016 (Aroclor 1016)	530	<5.7	<5.4	--	--	--	--	--	--	--
PCB-1221 (Aroclor 1221)	--	<11.3	<2.7	--	--	--	--	--	--	--
PCB-1232 (Aroclor 1232)	--	<11.3	<3.7	--	--	--	--	--	--	--
PCB-1242 (Aroclor 1242)	--	<8.5	<5.0	--	--	--	--	--	--	--
PCB-1248 (Aroclor 1248)	1,500	<8.5	<4.7	--	--	--	--	--	--	--
PCB-1254 (Aroclor 1254)	300	<7.1	<2.9	--	--	--	--	--	--	--
PCB-1260 (Aroclor 1260)	200	<12.7	<5.8	--	--	--	--	--	--	--
PCB-1262 (Aroclor 1262)	--	<5.7	<3.4	--	--	--	--	--	--	--
PCB-1268 (Aroclor 1268)	--	<5.7	<1.6	--	--	--	--	--	--	--
Dioxins/Furans (EPA 8290; ng/kg)										
2,3,7,8-TCDF	0.77	0.5 J	5.0	<5.3 P	<3.8 P	<1.6 P	13.4	10.8	37.3	16.2
2,3,7,8-TCDD	0.0091	<0.4	1.0 J	<1.9 I	4.5 J	24	6.30	4.65	6.45	2.58
1,2,3,7,8-PeCDF	2.6	<0.61	5.8	<5.7 P	<2.8 P	<11 P	18.3	13.2	45.6	15.6
2,3,4,7,8-PeCDF	--	<0.42	8.3	1,500	180	16,000	72.4	65.2	1,590 E	510
1,2,3,7,8-PeCDD	2.6	<0.54	8.5	35 J	18 J	240	67.4	25.0	84.8	21.5
1,2,3,4,7,8-HxCDF	2.7	1.4 J	22	220	43 J	1,400	46.8	33.3	255	51.3
1,2,3,6,7,8-HxCDF	2.7	2.2 J	13	<4.6 P	<2.2 P	<12 P	42.4	32.2	280	81.9
2,3,4,6,7,8-HxCDF	2.7	3.1 J	13	310	58	3,200	74.2	57.3	652	214
1,2,3,7,8,9-HxCDF	2.7	0.96 J	14	120	20 J	1,000	<0.408	<0.347	<0.835	<0.494
1,2,3,4,7,8-HxCDD	--	<0.55	15	42 J	25 J	150	53	25.4	43.9	20.3
1,2,3,6,7,8-HxCDD	--	0.51 J	150	150	110	680	659	137	282	118
1,2,3,7,8,9-HxCDD	--	<0.49	29	90	65	430	333	72.8	123	64.2
1,2,3,4,6,7,8-HpCDF	690	2.5 J	250	430	210	2,300	387	231	449	235
1,2,3,4,7,8,9-HpCDF	690	<0.58	16	52	19 J	340	23.2	15.7	73.8	21.2
1,2,3,4,6,7,8-HpCDD	690	2.5 J	3,100	2,000	1,200	2,400	3,160 E	1,540 E	2,550 E	1,530 E
OCDF	23,000	2.9 J	490	630	240	460	331	295	310	366
OCDD	23,000	8.5 J	27,000	13,000	7,500	10,000	18,300 E	10,300 E	18,800 E	10,000 E
Total TCDF	--	12	79	3,500	610	16,000 E	455 P	401 P	4,980 P	1,490 P
Total TCDD	--	<0.4	35	160	84	890	102	80.4	244	73.5
Total PeCDF	--	34	140	16,000	2,200	150,000 E	964 P	878	22,000 P	6,800 P
Total PeCDD	--	<0.54	53	510	200	3,700	574	255	1,150	215
Total HxCDF	--	20	570	8,500	1,400	93,000 E	915 P	698	8,920 P	2,970 P
Total HxCDD	--	4.5 J	600	1,300	920	7,300	4,340	1,040	2,300	831
Total HpCDF	--	4.6 J	800	1,300	500	6,300	798	530	1,140	689
Total HpCDD	--	4.9	6,000	3,900	2,600	5,000	6,920	3,280	4,620	2,740
TEQ	--	1.5	80	600	130	5,700	259	108	773	255
Butyl Tins (Krones Method; ug/kg)										
Tributyltin	2.3	<37	<36	--	--	--	--	--	--	--
Dibutyltin	--	<56	<53	--	--	--	--	--	--	--
Butyltin	--	<39	<38	--	--	--	--	--	--	--

Notes:

1. µg/kg (ppb) = micrograms per kilogram (parts per billion)
2. mg/kg (ppm) = milligrams per kilogram (parts per million)
3. < = Not detected above the method reporting limit (MRL)
4. JSCS = Screening levels from Portland Harbor Joint Source Control Strategy – Final (Table 3-1 Updated July 16, 2007). December 2005.
5. 1n(a) = Reported as total Benzo(b,k)fluoranthene: result may be biased high.
6. P = The amount reported is the maximum possible concentration due to possible chlorinated diphenylether interference.
7. BU = Analyte was detected in associated method blank above the reporting limit. Sample concentrations were less than 5 times the concentration detected in the method blank and consequently the sample results are considered non-detect.
8. Shading denotes exceedence of JSCS SLV.
9. J = Estimated.
10. E = Above the High Calibration Limit.



Base map prepared from USGS 7.5-minute quadrangles as provided by TerraServer.

0 2,000 4,000

Approximate Scale in Feet

Facility Location Map

Former Wharf Road Surface Soil Sampling
Port of Portland / Metro
Willamette Cove Upland Facility - Portland, Oregon

Ash Creek Associates
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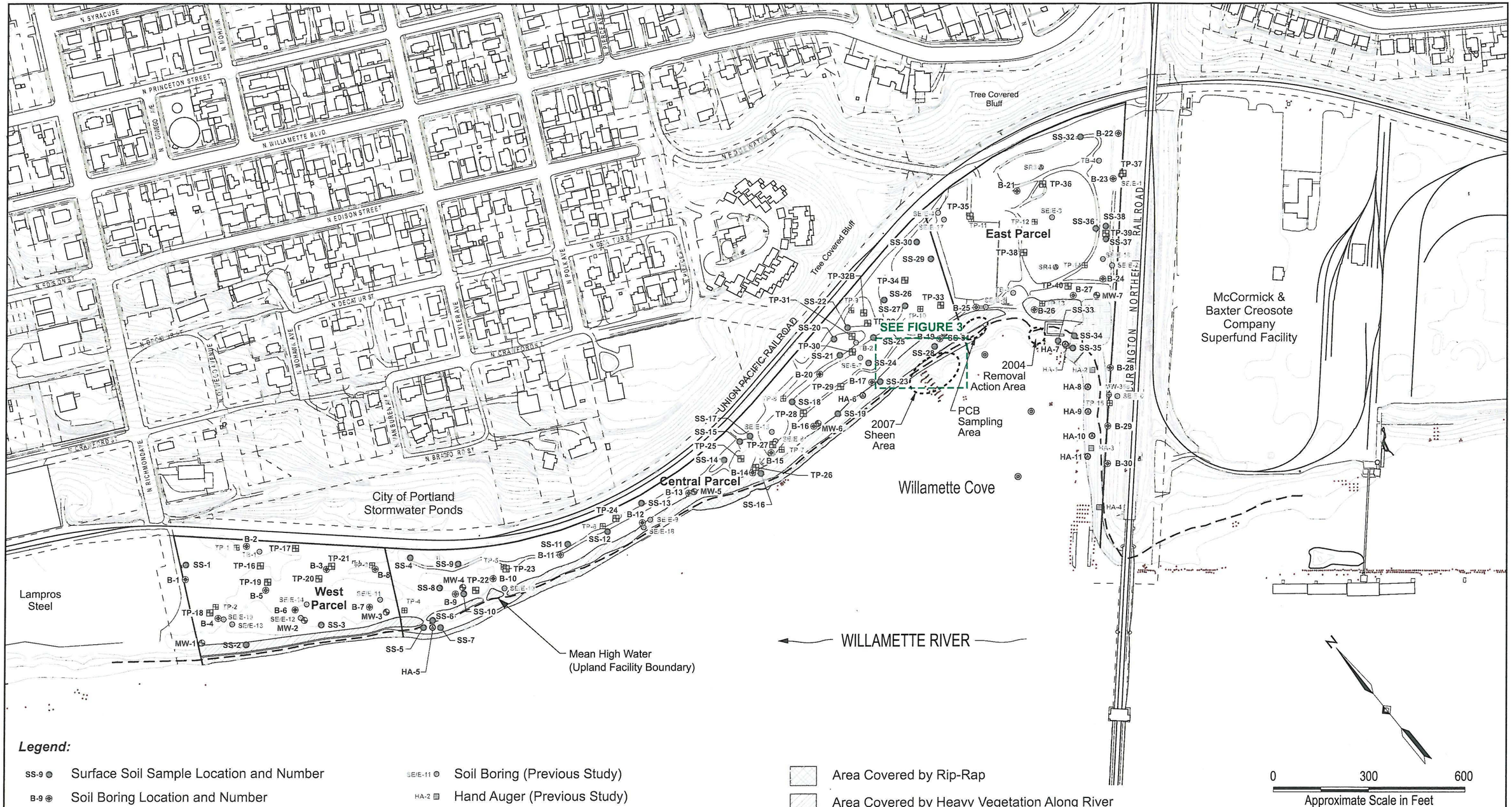
APEX

Project Number	1056-03	Figure
October 2012		1



Legend:

- SS-9 — Surface Soil Sample Location and Number
- B-9 — Soil Boring Location and Number
- HA-5 — Hand Auger Soil Boring Location and Number
- TP-24 — Test Pit Location and Number
- MW-5 — Monitoring Well Location and Number
- Sediment Sample Location
- SE/E-11 — Soil Boring (Previous Study)
- HA-2 — Hand Auger (Previous Study)
- TP-4 — Test Pit (Previous Study)
- SR4 — Surface Soil Sample (Previous Study)
- MW-35s — Monitoring Well Location and Number (Previous Study)
- Area Covered by Rip-Rap
- Area Covered by Heavy Vegetation Along River
- Area Covered by Clean Imported Sand
- Area of Armored Sediment Cap

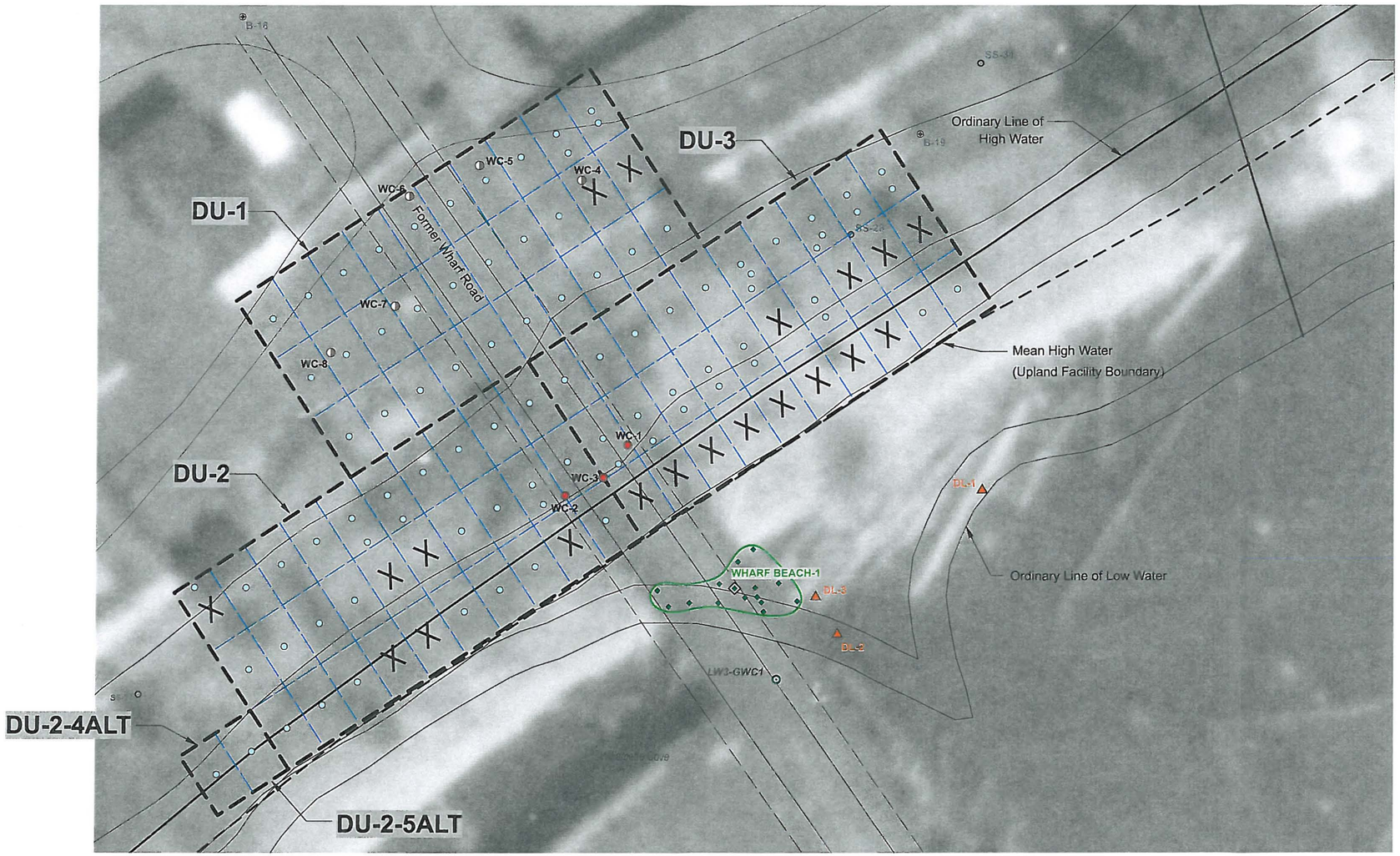
Note: Base map prepared from an electronic file provided by Hart Crowser.

Upland Facility Plan

Former Wharf Road Surface Soil Sampling
Port of Portland / Metro
Willamette Cove Upland Facility - Portland, Oregon

Ash Creek Associates
A Division of Apex Companies LLC
APEX

Project Number	1056-03	Figure
October 2012		2



0 30 60

Approximate Scale in Feet

Legend:

- SS-9 — Surface Soil Sample Location and Number
- B-9 — Soil Boring Location and Number
- *LW3-GWC1* — LWG Sample Location
- DL-1 — Beach Sediment Sample (September 2007)
- Shovel Pit Exploration Locations
- WHARF BEACH-1 — Shovel Pit Sample Location
- WC-4 — Push-Probe Sample Location (2010)
- WC-1 — Surface Soil Sample Location (2010)
- Proposed Incremental Sample Decision Unit
- Sample Grid Overlay
  Incremental Sample Point
- X — Location Not Accessible

Note: Base map prepared from an electronic file provided by Hart Crowser and a USACE 1961 aerial photograph.

Former Wharf Road Area Explorations

Former Wharf Road Surface Soil Sampling
Port of Portland / Metro
Willamette Cove Upland Facility - Portland, Oregon

Ash Creek Associates
A Division of Apex Companies LLC / APEX

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Attachment A

Photograph Log

Attachment A
PHOTOGRAPH LOG

Project Name: Willamette Cove Upland Facility
Project Number: 1056-03

Client: Port of Portland
Location: Portland, Oregon

Photo No: 1 **Photo Date:** 8/2/2012 **Orientation:** West **Description:** Mean High Water Line marked with orange paint on armor rock.	

Photo No: 2 **Photo Date:** 8/6/2012 **Orientation:** South **Description:** Typical sampleable location within armor rock. Note the limited material available for sampling.	

Attachment A
PHOTOGRAPH LOG

Project Name: Willamette Cove Upland Facility
Project Number: 1056-03

Client: Port of Portland
Location: Portland, Oregon

Photo No: 3 **Photo Date:** 8/10/2012 **Orientation:** Northwest **Description:** Attempt to gain access through poison oak bush.	

Photo No: 4 **Photo Date:** 8/10/2012 **Orientation:** Northeast **Description:** Example of sampling grid covered with poison oak.	

Attachment A
PHOTOGRAPH LOG

Project Name: Willamette Cove Upland Facility
Project Number: 1056-03

Client: Port of Portland
Location: Portland, Oregon

Photo No: 5	
Photo Date: 8/7/2012	
Orientation: West	
Description: Typical vegetation present middle to upper riverbank.	

Photo No: 6	
Photo Date: 8/7/2012	
Orientation: Not applicable	
Description: Typical penetration through vegetation. Note armor rock in hole.	

Attachment B

Laboratory Analytical Report (CD-Rom)